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(54) **METHOD FOR MICROFLUIDIC FLOW MANIPULATION**

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(52) **U.S. Cl.** **137/1**; 137/896; 366/341; 366/348

(58) **Field of Search** 137/1, 896, 897, 137/898; 366/341, 348

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(57) **ABSTRACT**

Disclosed is an apparatus and method for the mixing of two microfluidic channels wherein several wells are oriented diagonally across the width of a mixing channel. The device effectively mixes the confluent streams with electrokinetic flow, and to a lesser degree, with pressure driven flow. The device and method may be further adapted to split a pair of confluent streams into two or more streams of equal or non-equal concentrations of reactants. Further, under electrokinetic flow, the surfaces of said wells may be specially coated so that the differing electroosmotic mobility between the surfaces of the wells and the surfaces of the channel may increase the mixing efficiency. The device and method are applicable to the steady state mixing as well as the dynamic application of mixing a plug of reagent with a confluent stream.

7 Claims, 20 Drawing Sheets